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END SEMESTER REGULAR /RETEST EXAMINATION 2025 (OLD)
NOVEMBER/DECEMBER – 2025

Semester : 5th (OLD)

Branch : Civil Engineering

Subject Code : CV-504

GEOTECHNICAL AND FOUNDATION ENGINEERING

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) Question Nos. 1, 2, 3, 4 and 5 are compulsory.

(ii) Answer any *three* from Question Nos. 6, 7, 8, 9 and 10.

1. Choose the correct answers : 1×5=5

(a) The soil transported by river is called

(i) aeolian soil (ii) alluvial soil

(iii) marine soil (iv) lacustrine soil

(b) Which one of these is the correct relation between void ratio (e) and porosity (n)

(i) $e = n + ne$ (ii) $e = 1 - n$

(iii) $n = e/(1+n)$ (iv) $e = n/(1+n)$

(c) The constant head permeability test is most suitable for

(i) Clayey Soil

(ii) Silty Soil

(iii) Coarse-Grained Soil

(iv) Fine-Grained Soil

(d) In the Standard Proctor compaction test, the energy is applied by

(i) Kneading action with a tamper foot

(ii) Dropping a hammer a specific number of times in layers

(iii) Applying a static load with a hydraulic press

(iv) Vibrating a plate compactor.

2. Fill in the blanks : $1 \times 5 = 5$

(a) The _____ bearing capacity is the maximum gross pressure a soil can withstand before shear failure, without any consideration of settlement.

(b) Soil samples that retain the natural structure and water content of the soil are called _____ samples.

(c) The part of a structure that transfers the load to the soil is called the _____.

(d) Soil transported by wind is called _____ soil.

(e) A soil whose particles are all nearly the same size is described as _____ graded.

3. Write True or False : $1 \times 5 = 5$

(a) Effective stress is also known as Pore water pressure.

(b) Flow lines and Equipotential lines are not perpendicular to each other.

(c) Boundary water content between Plastic state and Liquid state is called Liquid Limit.

(d) Standard Proctor Test is performed to find the Degree of Saturation in soil.

(e) Coefficient of Permeability depends upon Particle size of soil.

4. Define the following terms : $1 \times 5 = 5$

(a) Void Ratio

(b) Porosity

(c) Degree of Saturation

(d) Water Content

(e) Specific Gravity.

5. A sample of saturated soil has water content of 30%. The specific gravity of soil is 2.70. Determine its : 5

(a) Void Ratio

(b) Porosity

(c) Saturated Unit Weight

(d) Dry Unit Weight.

6. (a) Define Darcy's Law of Permeability.

(b) Write about the factors affecting Permeability.

(c) What are the applications of Flow Net ?

(d) A constant head permeability test is carried out on a cylindrical soil sample of sand 10 cm diameter and 15 cm height. 120 cm^3 of water is collected in 1.5 minutes, under a head of 30 cm. What is coefficient of permeability (cm/sec) ? $3+5+4+3=15$

7. (a) What is Compaction ?

(b) Differentiate between Standard Proctor test and Modified Proctor test.

(c) Write about the factors affecting compaction.

(d) What is Soil Stabilization ? Mention any three methods of soil stabilization.

$1+5+5+4=15$

8. (a) Draw a neat sketch of a combined footing and a strap footing.

(b) What are the main differences between a shallow foundation and a deep foundation ?

(c) What are the criteria for selection of type of foundation ?

(d) Why are pile foundations constructed ?

$5+2+3+5=15$

9. (a) How does water table affect the bearing capacity of soil ?

(b) Explain a field method for determination of bearing capacity.

(c) Define active earth pressure and passive earth pressure.

(d) Differentiate between uniform and differential settlement. $3+6+2+4=15$

10. (a) What are the advantages and disadvantages of Direct Shear Test ?

(b) What is the importance of shear strength of soil ?

(c) Why is site investigation and sub-soil exploration necessary ?

(d) What are the types of soil exploration ?

4+4+5+2=15